

Serial number: 10/016,844

#### REMARKS

Applicants withdraw their traverse of the restriction requirement and affirm their election of species of (1) bismaleimide in combination with the cinnamyl compound on page 12, line 3, (2) a bisphenol A epoxy resin, and (3) 1,2,4,5-benzenetetracarboxylic anhydride/2-phenyl-4-methylimidazole adduct.

Applicant's adhesive as claimed is a composition comprising two chemistries, one which fully cures before the second. The art cited by the Examiner discloses two component compositions that cure together.

**Satoh (US 6187416)** The Examiner has rejected claims 1 to 5 under 35 USC 102(a) as being anticipated by Satoh and relies on Example 1. There are at least two indications that Satoh does not teach dual cure at two separate temperatures. First, there is only one accelerator used, the Curezol 2PX epoxy curing accelerator, and none for the BMI. This indicates that the two resins, the epoxy and the BMI are intended to cure at the same time. Also, it is generally known that both these resins have a broad gradual cure from about 140°C to about 200°C. Second, at column 4, line 65 to column 5, line 3, it states that the "coating was air-dried and then heated at 140°C for 5 minutes to obtain a resin-coated copper foil having a *semi-cured* resin layer." Final cure occurs after heating for 4 hours at 200°C. These resins co-cure, and one is not completely cured before the other as in applicants' composition.

**Capote (US 2001/0020071)** The Examiner has rejected claims 1 and 3-6 under 35 USC 102 (a) or (b) as anticipated by *Capote* and relies on Example 6. *Capote* is directed to a resin system comprising epoxy, cyanate ester, and bismaleimide that all co-cure with a chosen co-curing agent. See paragraphs [0063] to [0066]. In paragraph [0066] it is stated that the inventive resin

composition as a liquid encapsulant is "*partially cured* by heating", which creates a "*partially polymerized* solid, which though not completely polymerized" at that point can be "heated rapidly to a temperature at which the free radical polymerization can occur to complete the polymerization." Here, as in *Satoh*, there is no dual cure in the sense that one chemistry completely cures independent of the other, as does occur in applicants' composition. With regard to Example 6, it is disclosed there that a BMI resin is adducted to the volatile co-curing agent APGE. This adduct is then reacted cyanate ester and epoxy in a staged cure for the purpose of preventing voids or bubbles. There is no teaching or suggestion that there are independent curing stages for the separate chemistries.

**JP 61-237436** The Examiner has rejected claims 1 and 3-6 under this Japanese patent and relies on the fact that it discloses a semi-curable adhesive comprising a BMI, triazine, and epoxy resin system. There is no teaching here of any dual cure. There is reference to semi-cure, which more likely means that the whole composition is partially cured at some point, and then finally cured later.

**JP 55-65217** The Examiner has rejected claims 1 and 3-6 under this Japanese patent and relies on the fact that it discloses a blend of BMI, an epoxy resin, hardener, and a photosensitizer that is semi-cured followed by heating. Applicants have obtained a full translation of this patent and enclose a copy for the Examiner's reference. On page 3 of the translation, the fourth full paragraph reads: "In the present invention, the maleimide compounds in the resin composition are irradiated with light at a low temperature in the presence of a sensitizer and undergo polymerization. The resulting three-dimensional crosslinks allow the formation of a network structure and a *semi-cured state*. The subsequent heat curing will result in curing of the epoxy resins and *progress of*

*the reaction of the maleimide compounds to induce complete curing and formation of a cured product with high heat resistance.*” This indicates that the maleimide compounds are not completely cured before the epoxy compounds and that final curing occurs at the same time for both the epoxy and maleimide compounds.

**Young (US 4,816,531)** The Examiner has rejected claims 1 and 3-6 under 35 USC 102 (a) or (b) as anticipated by *Young* and relies on the fact that a composition prepared from an epoxy, bisphenol A novolak, BMI, and an imidazole, is B-staged at 163°C and cured at 180°C and 200°C. At column 5, lines 2 to 9, it is stated that the prepreg is heated “at a temperature sufficient *to remove the solvent and to partially cure without gelat[i]on*” generally from 40°C to 180°C for a time preferably of 30 seconds to about 2 minutes. This prepreg is cured, column 5, line 17, at temperatures in the range of 160°C to 300°C at a time of 30 minutes to 4 hours. At column 6, Example 1 is heated at 163°C in a convection oven for about 2.2 minutes (which would comport with solvent removal) and cured in a press at 180°C, and *postcured* at 200°C. This patent also does not disclose, teach or suggest separate curing temperatures for the separate chemistries. Indeed, the lack of gelation clearly indicates there is no cure at the lower temperature.

**Jackson (US 5,081,167)** The Examiner has rejected claims 1 and 3-6 under 35 USC 102 (a) or (b) as anticipated by *Jackson* and relies on Example 1 to show a mixture of BMI, epoxy and cyanamide B-staged at 163°C and cured at 180°C and 220°C. At column 4, lines 44 to 56, it is disclosed that a substrate impregnated with the disclosed resin blend is partially cured without gelation at about 160°C to 195°C for a time effective to remove the solvent and to advance the resin to the B-stage. Cure of the resins occurs at 160°C to 200°C.

In all of the above references, B-stage involves either removal of solvent and/or partial curing of the resin mixtures. None of the above references discloses, teaches, or suggests a blend of resins with curing temperatures sufficiently separated to allow separate cures. For these reasons, applicants respectfully request the Examiner to withdraw the rejections on section 102 grounds.

The Examiner has also rejected claims 6 and 7 under 35 USC 103(a) as unpatentable over *Sato*, *Capote*, *JP 436* and *JP 217*, *Young* and *Jackson* in view of *Roth*, *Marshall*, and *JP 128*. Inasmuch as none of the art relied on actually teaches or suggests applicants' dual cure, the combination of that art with art disclosing the imidazole/anhydride adduct is incompetent to sustain an obviousness rejection. Applicants request the Examiner to withdraw the rejection on section 103 grounds.

Applicants submit the above remarks for the Examiner's consideration and respectfully urge the Examiner to the conclusion that the claims are in condition for allowance.

end of remarks